CLAIMS

1. A lens array comprising an array of lens elements having a backplane for reproducing an image located at the backplane, each lens having a nonunitary magnification and reproducing visual information from the backplane to a finite conjugate region in free space such that the reproduced visual information overlaps with visual information reproduced in free space by at least one neighboring lens element.

2. The lens array of claim 1 wherein the visual information is reproduced by the lens elements as a stereoscopic image.

3. The lens array of claim 1 further comprising a source of visual information on the backplane, the visual information comprising pixels each constituting a discrete component of visual information, each lens element producing an aerial image comprising multiple pixels simultaneously viewable at the conjugate region.

4. The lens array of claim 1 wherein the visual information produced in free space varies with a viewing angle, the lens elements having lens pitch defining center-to-center distances therebetween and cooperating to reproduce an image having a spatial resolution distinct from the lens pitch.

5. The lens array of claim 4 wherein the lens elements cooperate to reproduce an image having a spatial resolution greater than the lens pitch.

6. The lens array of claim 1 wherein the lens elements have magnifications ranging from 1:8 to 1:100.

7. The lens array of claim 1 wherein the lens elements cooperate to project a finite conjugate field to a series of curved quadratic surfaces in free space.

8. The lens array of claim 7 wherein quadratic surfaces produced by each of the lens elements intersect, forming a mosaic virtual field having locally varying spatial and angular resolutions.

9. The lens array of claim 8 wherein the lens elements have a residual field curvature so as to vary locally in magnification, the mosaic virtual field and varied magnification facilitating visual decorrelation of images individually produced by the lens elements.

10. The lens array of claim 1 wherein the lens elements have a residual field curvature so as to vary locally in magnification, the lenses providing an angular resolution increasing toward a center of a viewing field and a spatial resolution at increasing at peripheral angular locations.

11. The lens array of claim 10 wherein a degree of visual-information overlap determines a rate at which spatial resolution decreases with distance from the center of the viewing field.

12. A method of producing an aerial image in free space, the image having a spatial resolution and varying with viewing angle according to an angular resolution, the method comprising the steps of:

a. providing a lens array comprising an array of lens elements having a backplane and a nonunitary magnification, the lens array reproducing visual information to a finite conjugate region in free space, the spatial and angular resolutions of the image varying with the magnifications of the lens elements, visual information reproduced at the finite conjugate region by each lens element overlapping with visual information reproduced at the finite conjugate region by at least one neighboring lens element; and

b. selecting a magnification corresponding to a predetermined angular and spatial image resolution.

13. The method of claim 12 further comprising the step of varying a distance between the visual information and the backplane to vary the magnification.

14. The method of claim 12 wherein the visual information is reproduced by the lens elements as a stereoscopic image.

15. The method of claim 12 further comprising the step of providing a source of visual information on the backplane, the visual information comprising pixels each constituting a discrete component of visual information, each lens element producing an aerial image comprising multiple pixels simultaneously viewable at the conjugate region.

16. The method of claim 12 wherein the visual information produced in free space varies with a viewing angle, the lens elements having lens pitch defining center-to-center distances therebetween, the magnification causing reproduction of visual information at a spatial resolution distinct from the lens pitch.

17. The method of claim 16 wherein the spatial resolution is greater than the lens pitch.

18. The method of claim 16 wherein the selected magnification ranges from 1:8 to 1:100.

19. The method of claim 12 wherein the lens elements cooperate to project a finite conjugate field to a series of curved quadratic surfaces in free space.

20. The method of claim 19 wherein quadratic surfaces produced by each of the lens elements intersect, forming a mosaic virtual field having locally varying spatial and angular resolutions.

21. The method of claim 20 wherein the lens elements have a residual field curvature so as to vary locally in magnification, the mosaic virtual field and varied magnification facilitating visual decorrelation of images individually produced by the lens elements.

22. The method of claim 12 wherein the lens elements have a residual field curvature so as to vary locally in magnification, the lenses providing an angular resolution increasing toward a center of a viewing field and a spatial resolution at increasing at peripheral angular locations.

23. The method of claim 22 wherein a degree of visual-information overlap determines a rate at which spatial resolution decreases with distance from the center of the viewing field.